

THE DIRECTOR'S REPORT

THE ARNOLD ARBORETUM DURING THE FISCAL YEAR ENDED
JUNE 30, 1967

THE YEAR 1967 MARKS the ninety-fifth anniversary of the establishment of the Arnold Arboretum in 1872 by the bequest of James Arnold. Early in the year official greetings were received from several institutions with similar interests around the world. Rather than take particular note of this ninety-fifth anniversary, permission was requested from the Harvard Corporation to prepare special activities for the Centennial year, 1972. Our plans, therefore, are directed toward that year when we may indicate the many accomplishments of the past and make known the goals for the future.

For nearly a decade a legal controversy over the Arnold Arboretum had been conducted in the courts of Massachusetts. This proceeding, which involved the President and Fellows of Harvard College as trustees of the Arnold Arboretum, concerned the legal right and questioned the decision affirming the scientific importance of locating a portion of the herbarium, library, and other research collections and the staff in a building in Cambridge, occupied jointly by members of the Gray Herbarium and the Botanical Museum. A "working herbarium and library" was to be retained in Jamaica Plain in association with the living collections. During the preceding fiscal year the Supreme Judicial Court of Massachusetts dismissed the case subject only to the assurance in a report to be filed, indicating that an adequate library and herbarium do exist in Jamaica Plain; that the location of all books is indicated in the general index files; and that a plaque has been placed in the Cambridge building housing the Arboretum materials. A report indicating that these conditions have been met was accepted by Justice Spaulding for the Court and the case finally has been dismissed.

In association with this action books belonging to the Arnold Arboretum and deposited in the libraries of the Department of Biology and the Harvard Forest since 1933 were recalled and incorporated with the books of the Arnold Arboretum in Cambridge or Jamaica Plain.

The President and Fellows also approved altering the name of the herbarium building in Cambridge to the Harvard University Herbaria, the plural form being the equivalent of "Laboratories," to indicate the multiple occupancy of the building. A bronze plaque was cast and placed in the foyer of the building listing the several independent collections housed in it, and the date of its completion, 1954.

In 1965, the Harvard Corporation approved the establishment of an Institute of Plant Sciences at Harvard to represent the botanical staff of



Photograph of the building newly designated as HARVARD UNIVERSITY HERBARIA.

THE HARVARD UNIVERSITY
HERBARIA

▲ ▲ ▲
GRAY HERBARIUM AND LIBRARY

▲
PART OF THE
LIBRARY AND HERBARIUM
OF THE
ARNOLD ARBORETUM

▲
ORCHID HERBARIUM OF OAKES AMES
AND THE
PALEOBOTANICAL COLLECTIONS
OF THE
BOTANICAL MUSEUM

▲ ▲ ▲
COMPLETED 1954

The plaque recently installed in the building of the HARVARD UNIVERSITY HERBARIA.

the University, the Institute to consist of and represent the staff members of the several botanical organizations at Harvard as well as botanical scientists associated with biological organizations. During the past year the Arnold Arboretum was invited to join in association as part of the Institute of Plant Sciences. This invitation was accepted and membership has been approved by the Corporation. The Corporation also noted that its vote of January 19, 1953, concerning the identity of the Arnold Arboretum is still in effect, and that the procedures for the Director of the

Arboretum to submit recommendations for appointments and for approval of budgets directly to the President are still in order.

Staff:

Although changes in the composition of the staff of an organization are to be expected annually it is always with personal feelings of loss that deaths and retirements of employees of long association are recorded.

Professor Irving Widmer Bailey, Professor of Plant Anatomy, *Emeritus*, died suddenly on May 16th. Although stricken some weeks earlier with a coronary attack, his recovery had seemed probable when death came quickly. Professor Bailey received his A.B. degree from Harvard in 1907, and, except for a few years during World War I, was associated with Harvard continuously. He became associated with the Arnold Arboretum in 1933 when many members of the Bussey Institution staff moved to Cambridge, and he retired officially in 1955. He continued his research in the laboratory of the wood collection he developed for the Arnold Arboretum, and he worked and published on an active schedule to the day before his attack. Tributes to him and for his work have come from all parts of the world. A review of his life will be published in the next volume of this Journal.

Thomas H. Curry, assistant superintendent of buildings and grounds of the Arnold Arboretum, served its living collections in Jamaica Plain for 18 years. He had reached retirement age and would have been retired at the end of the fiscal year. His death occurred, after surgery, on April 30, 1967.

A new appointment during the year was necessary in anticipation of another retirement. Mr. Victor Ferenc Marx was appointed librarian of the Arnold Arboretum and, jointly, librarian of the Gray Herbarium on May 1, 1967. This appointment overlapped briefly that of Mrs. Lazella Schwarten. Mr. Marx came to Harvard from the University of Washington School of Librarianship.

Mrs. Schwarten served the library of the Arnold Arboretum for 23 years and, for the last 13 years, held a joint position as head librarian of the Gray Herbarium and the Arnold Arboretum. She not only served the staff and cared for a major library, but also aided taxonomic botanists, botanical historians, and many others in the field from institutions all over the world. She excelled in all these activities, and her aid has been acknowledged with spontaneous gratitude. Although her efforts in preparing the *Index to American Botanical Literature* published by the Torrey Botanical Club are noted only as items in her bibliography published each year in these reports of the Director, this index is a major tool in taxonomic and general botanical bibliographic research. Her bibliographies of the published writings of many present and former staff members are also most useful. Mrs. Schwarten's greatest effort in the past decade however, has been the organization of the books of the Gray Herbarium and the Arnold Arboretum in Cambridge, and those of the Arnold Arboretum

relocated in Jamaica Plain, into working libraries. Only the staff that saw this develop can truly appreciate the tremendous effort involved. Finally, we would note that Lazella Schwarten served the botanical world through the *Journal of the Arnold Arboretum*. Articles by her are not numerous, but the word "Circulation" on the cover is also inadequate to describe her work in making certain that botanists around the world received the Journal.

When the University announced Mrs. Schwarten's retirement, to take place this year, the associated staffs scheduled an appropriate gathering. A gift from the Arnold Arboretum and Gray Herbarium recognized her service to both institutions. In addition a bound volume of letters solicited from her friends who had used the library recorded gratitude from many botanists of numerous countries. The July number of this Journal was also dedicated to Lazella Schwarten. Regretfully, this report of the Director records her retirement from the staff.

Dr. Harrison Leigh Flint whose appointment as Associate Horticulturist was effective on July 1, 1966, for five years, came to our staff from the University of Vermont.

Gordon Parker DeWolf, Jr., was appointed Horticultural Plant Taxonomist, effective March 15, 1967, for a period of five years. Dr. DeWolf received his Ph. D. degree from Cambridge University, having worked under Dr. E. J. H. Corner on the genus *Ficus* in tropical America. He served as an Associate Professor of Botany at Georgia Southern College before joining the Arboretum staff. His research interests in cultivated plants and native floras are supported by his field work and study in such areas as New England, Malaysia, Europe, and Africa.

Two Mercer Fellows completed their studies during the year. Mr. Pablo Legname returned to his position at the University of Tucuman in Argentina and Miss Sandra Shannon accepted a position at the Waltham Field Station of the University of Massachusetts. Dr. Charles C. Tseng completed his studies of the flowers and fruits of the Araliaceae conducted during the summer as a Mercer Research Fellow, and returned to his position at Windham College in Vermont.

Several new assignments were undertaken by the staff. Dr. Richard Howard was appointed to the Commission on Horticultural Nomenclature and Registration for the International Society for Horticultural Science. Dr. Lorin Nevling was appointed a member of the Faculty of Arts and Sciences of Harvard University. He was also appointed Secretary of the American Society of Plant Taxonomists and designated as a representative of the Council of that organization to the American Association for the Advancement of Science, to serve also as Secretary of the Systematic Section of the Botanical Society of America. Dr. Bernice Schubert was appointed Secretary of the Standing Committee on Stabilization of the International Association of Plant Taxonomists. Dr. Carroll Wood was appointed Lecturer on Biology during the year 1966-67, while he was teaching a course in plant taxonomy.

Horticulture:

Recent reports have referred to the drought of the last five years. The rainfall for 1966 was 41.14 inches, 5.55 inches below the normal for Boston. During this period the three conspicuous ponds in the Arboretum were at their lowest since 1937. Watering with metered water was continued through the summer of 1966. The plastic piping which had been run to the top of Bussey Hill made it possible to water and probably to save the large collection of leguminous and ericaceous shrubs there.

The dry spell was broken during the winter, however, and between January 1 and May 31, 1967, approximately 25.6 inches of rain were recorded at the Arboretum. This was an excess of 5.02 inches over the normal. A total of 7.32 inches in May made it the second wettest May in 97 years of official U. S. Weather Bureau records. The wetness was accompanied by unusual cold so that the common lilacs did not come into full bloom until June 3, the latest flowering time in the 36 years we have kept such records.

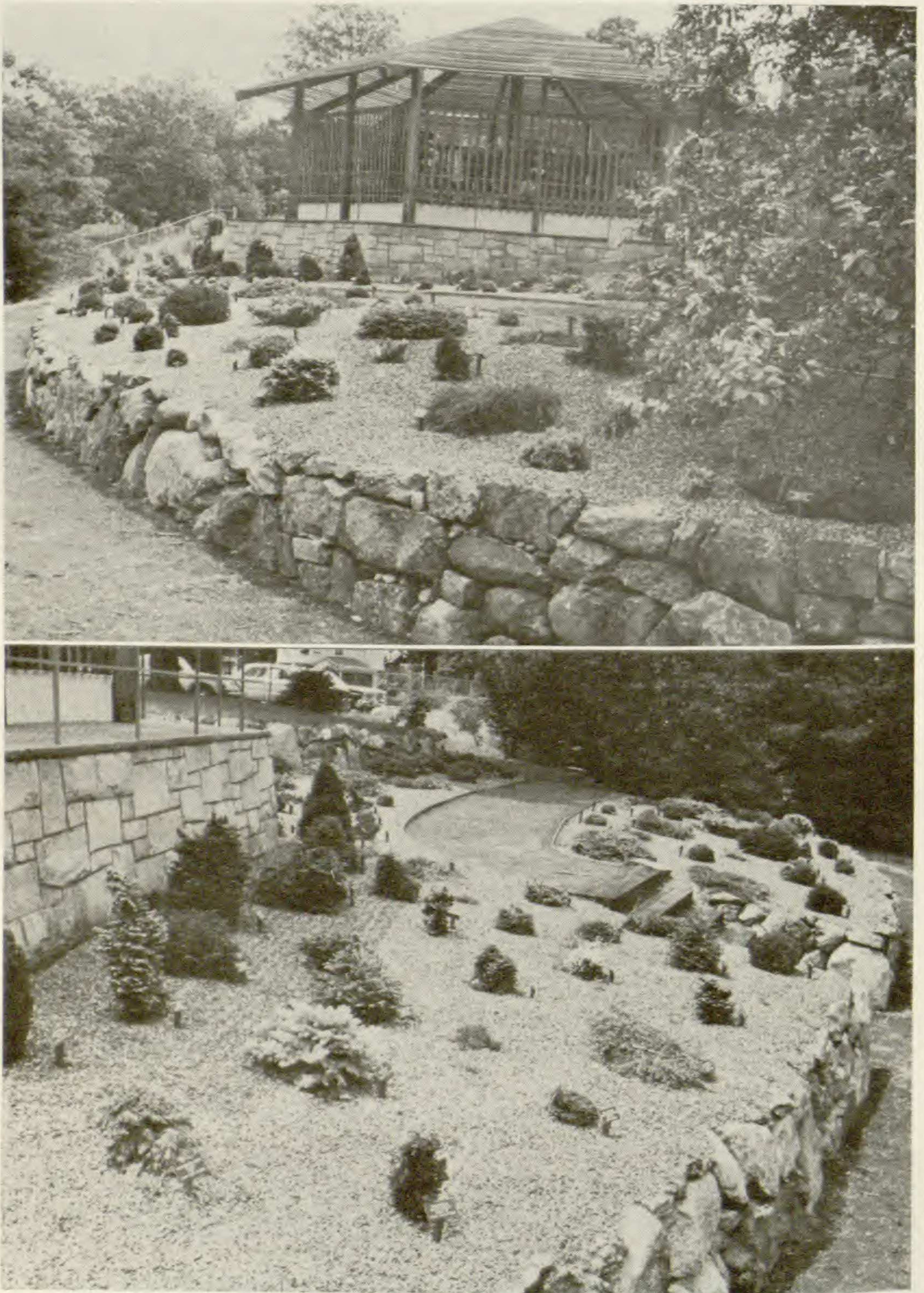
The conditions of fall drought, and excess water and low temperatures in the spring again altered our planting schedule. Plants could not be dug in the nurseries in Weston nor cared for in many areas on the grounds in Jamaica Plain. Eventually, however, 570 plants representing 480 taxa were added to the collections. Most significant was the planting of 50 *Rhododendron fortunei* selections which originated on the Dexter Estate in East Sandwich, Massachusetts. Dr. Wyman has served on a committee to collect and evaluate these widely distributed "Dexter Hybrids" of which the most desirable are now planted on Hemlock Hill. Regular embossed labels identify them as completely as possible and include the location of the original plant.

A severe ice storm again occurred in New England in February causing considerable branch damage. In the *Thuja* and *Chamaecyparis* collection much pruning and repair was needed and duplicate, old, and broken plants were removed to give the healthy specimens additional space.

Work continues on the terracing of the slope below the Larz Anderson bonsai house near the Dana Greenhouses. Field stone walls, graded paths and steps made of railroad ties have enhanced the appearance of the area where more than 125 taxa of dwarf conifers have been planted and mulched with gray stone.

The old Centre Street roadbed in the northwest corner of the Arboretum was excavated to an average depth of two feet. Large quantities of mulch and any available soil were used to fill the road bed. Grading was hardly completed when snow stopped further work; seeding and some planting were delayed until spring. The cost of reclaiming this old road area amounted to \$7,000 for contract labor with heavy machinery.

During the winter it was possible to begin a clearing and cleaning operation on the low land adjacent to the Hebrew Rehabilitation Center for the Aged. This hospital was built on land formerly called Joyce Kilmer Park, acquired from the City of Boston. It is adjacent to land owned by Harvard University for the Arnold Arboretum and not under lease from



Two views of the terrace for genetic dwarf conifers below the Larz Anderson *bonsai* house. The wall is of native field stone. Gray stone is used for mulch.

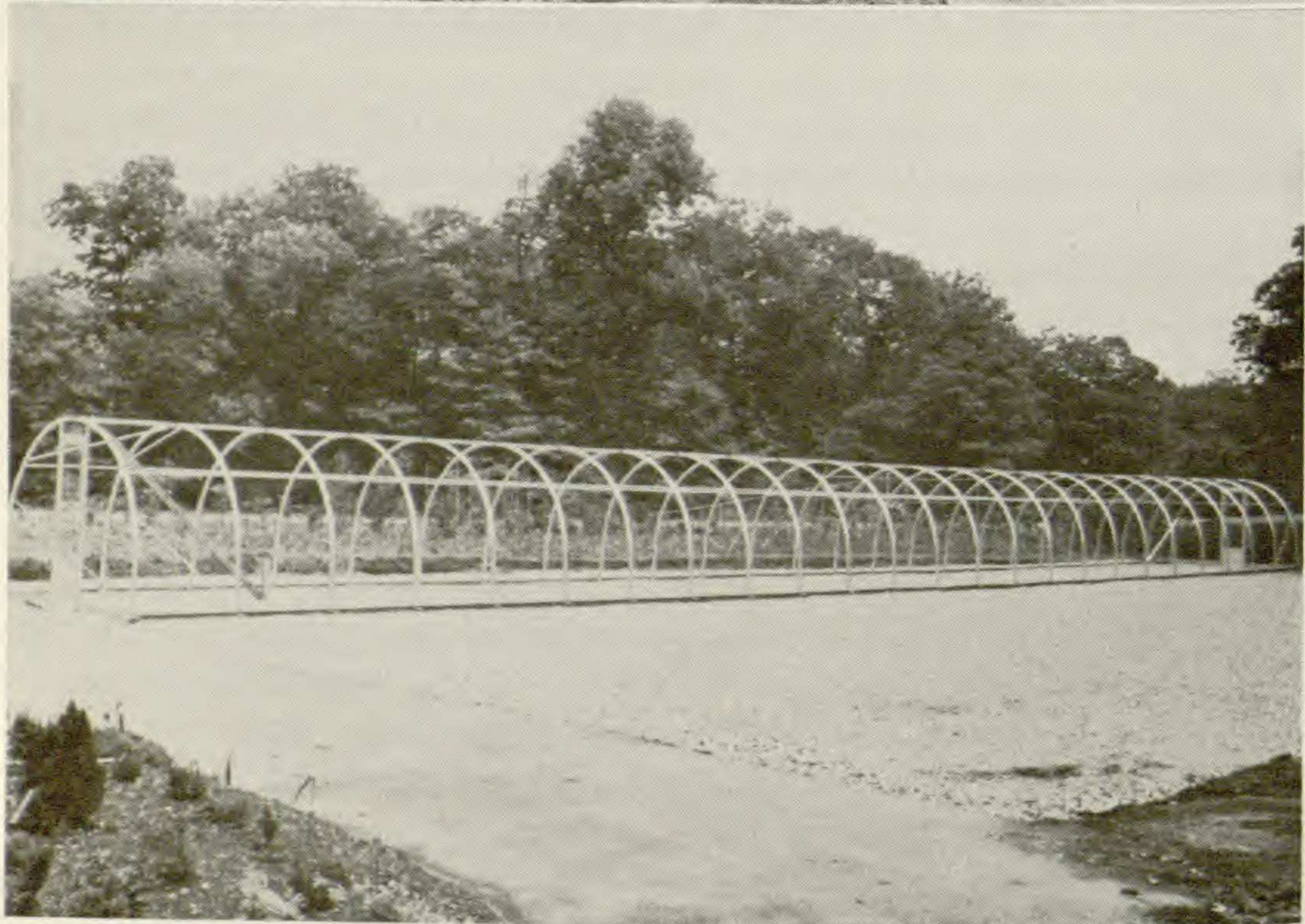
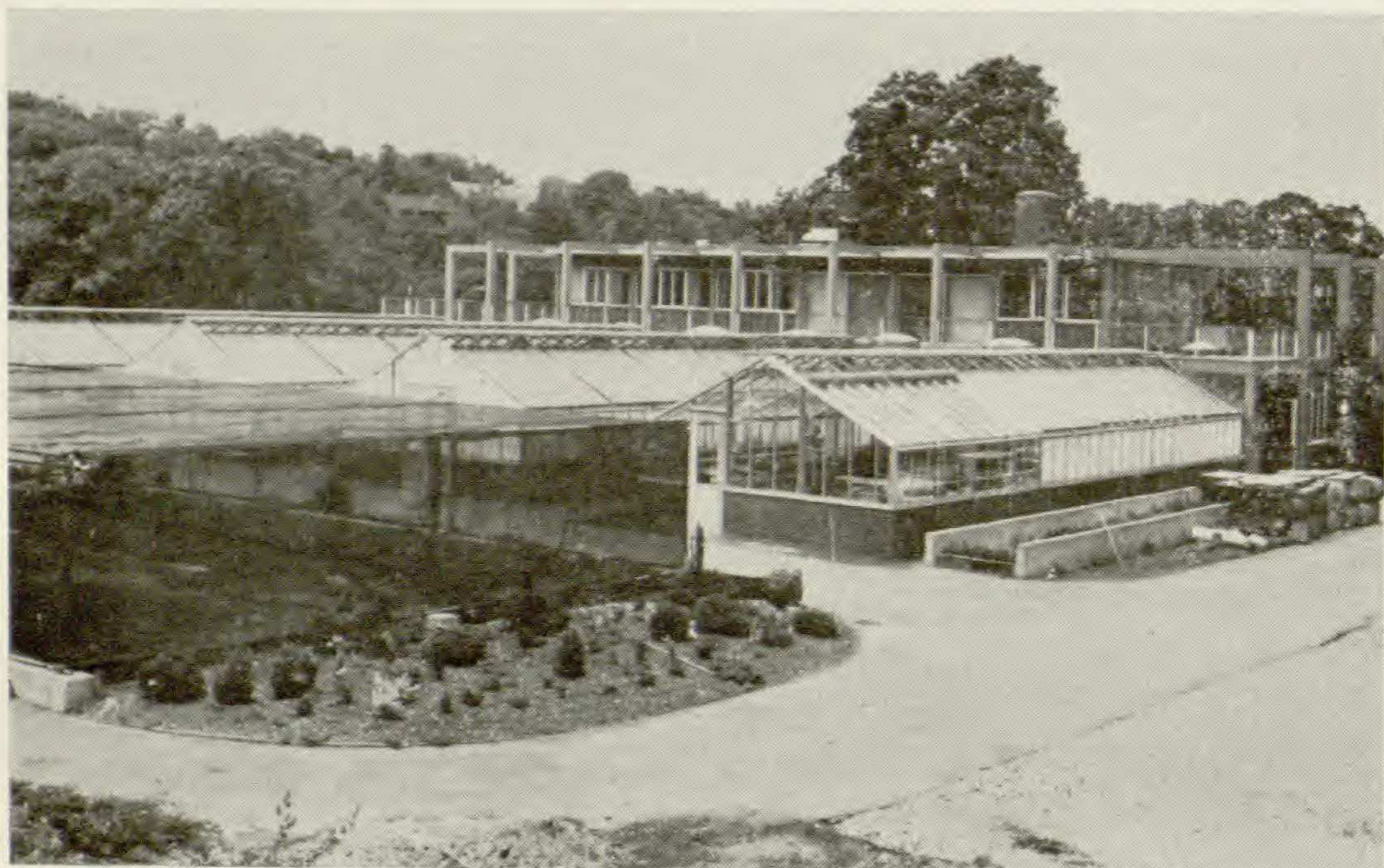
the City. The unkempt low land served as a barrier during the construction of the hospital but the present operations anticipate development of the area as a formal part of the Arboretum. A major expenditure will be required for fencing, development of roads and paths, and redevelopment of top soil before the land can be fully utilized.

The threat to the Peters' Hill plantings from the bill filed in the Legislature to create a ski tow in the Arboretum required action this year to control access in the winter. The area is normally not ploughed by the City and our own equipment is inadequate for the purpose. A chain link fence was installed for half a mile along Bussey Street giving immediate protection to the half of the area most readily approached by automobile. The police were requested to enforce the regulations of the Park Department regarding skiing. Eventually, additional expenditures for fencing may be required to prevent skiing on the hill and to protect the younger plantings.

During the past year air pollution legislation prohibiting open fires was adopted in Boston. Withholding of permission to burn debris and trash from the grounds has proven to be extremely inconvenient and the added expense of commercial waste-disposal is inevitable.

Previous reports have referred to changes proposed for the buildings in Jamaica Plain if legal directives did not require the return of materials from Cambridge. During the year the first of these changes was completed by the addition of a glass unit consisting of three controlled-environment sections to the Dana Greenhouses. In addition, air conditioning was installed in the laboratory for cytology and morphology, new lighting was installed in the library of the Administration Building and safety flood lights added on to the front and rear of the building for automatic operation during the winter. New lunch room and additional rest room facilities have been completed. Plans have been developed for the construction of a new garage and vehicle repair facility which will stand free yet close to the Administration Building, permitting the removal of motor vehicles and grounds equipment from the basement. Architects' drawings are being prepared prior to a request for bids on construction. Also under construction is a laboratory for plant hardiness studies, including those in cryobiology, in the basement of the Dana Greenhouses. A "Gro-Mor" greenhouse of polyethylene plastic over aluminum frames 11 × 96 feet has been erected in the greenhouse area. A rearrangement of the nursery area has been completed and includes the installation of new ground drainage, watering facilities, and gravel surfaces for the handling of plants grown in plastic containers. Slightly over 1000 square feet are devoted to this purpose.

Through the efforts of Dr. Flint a new coöperative hardiness testing program has been initiated to obtain more reliable information on the characteristics of some of the more important woody ornamental plants in parts of New England colder than the Boston area. This program is to be carried out with the assistance of about 25 coöperators selected as uniformly as possible in hardiness zones 3 and 4. Pot-grown plants of



ABOVE: Rear view of the Dana Greenhouses of the Arnold Arboretum. The unit on the right was newly constructed in 1966.

BELOW: The "Gro-Mor" greenhouse of polyethylene plastic on aluminum frames and the compacted gravel area for the pot grown plants used experimentally for hardiness tests at the Arnold Arboretum.

about 20 taxa will be distributed annually for trial. At the same time observations will be made on plants already under test. To date 19 coöperators have accepted invitations to participate. A limited number of plants was distributed in the Spring of 1967 and the program is expected to reach full scale in 1968. More than 40 taxa have been propagated for distribution in 1967, 1968, and 1969.

Mr. Fordham has continued his long-range program of testing seed germination and propagation procedures for the plants within the Arboretum collections. Ninety-six additional taxa were handled during the year for such information. The search for abnormal plants in natural habitats also continues; eleven seedling populations and 16 asexual propagations from witches'-brooms are presently under study. Seedling plants developed from seeds of abnormal conifers have been followed for several years and the accumulating records now begin to shed light on the nature and cause of the unusual growth forms.

Three members of the horticultural staff, Dr. Wyman, Mr. Fordham, and Mr. Gensel, spent some time in Puerto Rico conducting studies and observations on the growth and reproductive characteristics of plants in the elfin forest project-area. Plant materials were propagated on the site and in nearby areas while comparable materials have been returned to Jamaica Plain for similar tests under more scientifically controlled conditions.

The past winter again produced unusual flowering patterns in many shrubs because of snow protection near the ground and varying levels of cold air above. Mr. Gensel, working with Dr. Flint, has undertaken controlled studies of cold resistance through flower bud development in several taxa grown in the Arboretum. The variations which occurred in taxa of *Forsythia* and *Rhododendron* under natural conditions during the past winter require much further study before an explanation is possible.

At the Maryland meetings of the American Association of Botanical Gardens and Arboreta the Arnold Arboretum was again appointed National Registration Center for woody plants not otherwise represented by Societies. The International Society for Horticultural Sciences approved the designation of the Arnold Arboretum as International Registration Authority for cultivars in *Weigela* and accepted the list published in *Arnoldia* as the International Registration List. At a special meeting of the IABG Dr. Howard was appointed funding coördinator for a project to test the methods of electronic data processing in relation to the record systems of botanical gardens. The Arboretum will work in coöperation with the University of Tennessee Arboretum where this program will be developed, using the computer systems at Oak Ridge.

Much of the time of the propagation staff is devoted to filling requests for plant parts for propagation or as the basis for special research studies. During the year 66 taxa were propagated for such special requests as part of 184 shipments of material to other gardens and to scientists in 17 countries. The propagation staff received 231 shipments of materials from 32 countries comprising 845 taxa. We supplied healthy materials for other

gardens to grow, aberrant material for special developmental studies, diseased material for pathological investigation, foliage for animal food in special research projects, and dried materials for chemical extractions.

Case Estates:

With the increasingly large number of people who visit the Case Estates we have had a growing number of requests for literature, information, or guided tours of the land and the collections. During the past year two regularly scheduled field courses were conducted on the grounds, and two special programs for the Friends of the Arnold Arboretum, consisting of a series of evening lectures in the "Red Schoolhouse" and a series of Sunday afternoon lecture-tours on the grounds, were held.

Special encouragement is given to students and to school classes to visit the grounds and to learn the purpose of the work being done there. Awards for study projects in the elementary school system, initiated this year, should be continued. The students involved have brought their parents to the grounds and appreciation increases for the efforts of the Arboretum within the town of Weston.

During the year a trial bed of 70 taxa of *Allium* was started to contrast with those of *Narcissus*, *Lilium*, and *Hemerocallis*. Most of the *Allium* material was grown from seed and much was a gift of Mr. Nathaniel Whittier. The *Iris* collection previously established for trial was supplemented by a gift of representatives of the Dykes medal winners which show, for teaching purposes, some of the outstanding variation in the bearded irises.

A collection of 79 kinds of native asters of known origin and genetic structure was established on the Case Estates; a section of land was prepared for the studies of a new staff member on the species of *Dahlia*.

A collection of crab apples established several years ago in the big field on Newton Street across from the Junior High School flowered spectacularly this spring. The cultivar of *Malus* 'Henrietta Crosby' developed by Dr. Sax and planted along Wellesley Street was also unusually beautiful.

The isolated location of the Case Estates permits use of the property as a holding area for plants in post-entry quarantine. Almost 500 of the plants introduced by Dr. Wyman from his recent trip to Europe were released during the year and are growing on in the nursery areas. Others remain under continued restriction for future release.

Herbarium:

During the year 24,264 specimens were mounted and added to the herbarium, bringing the total number of specimens to 849,269. Of these, 5,861 were added to the herbarium of cultivated plants which is maintained in Jamaica Plain. That collection now contains 130,531 specimens.

In order to correct some of the unbalance of content in the herbarium of cultivated plants a program of special collecting and special exchanges has been emphasized recently. It is hoped that the result will be an in-

creased representation of cultivated herbaceous plants and a better indication of the range of distribution of many cultivated woody plants. Such development will increase the significance of this particular collection and broaden its function of providing definitive information. The collection in Jamaica Plain is also being checked to insure that all the taxa cited in Rehder's *Manual of cultivated trees and shrubs* and in Bailey's *Manual of cultivated plants* are, in fact, represented in the herbarium of cultivated plants.

A total of 18,863 specimens was received for the herbarium during the year. Of these, 8,791 were in exchange, 3,627 were gifts, 5,388 obtained through subsidy or support of field expeditions, 411 for identification, and 116 by special exchange, with 350 representing staff collections. This material came from herbaria or collectors in the United States, Papuasias, Europe, Western Malaysia, and Mexico and the West Indies in diminishing order, with specimens from seven other geographic areas also. We sent 10,675 specimens in exchange to other institutions; 899 as gifts; and 70 in exchange for identification.

For studies by staff and students a total of 76 loans were requested and received from 26 institutions, 14 in the New World and 12 in the Old World. The total of 7,152 specimens represented an average loan of 94 specimens. We received requests for material from our collections and made 143 loans to 78 institutions which averaged 115 specimens and comprised a total of 16,539 specimens. These were made to 28 foreign institutions and to 45 within the United States.

These series of figures do not indicate the great amount of organization and labor involved in maintaining high standards of quality in the herbarium and in keeping the collections in good order so that the many routine requests for information, photographs, identifications and so forth may be filled competently. Although the growth of the herbarium and the increase in its use is desirable and commendable, such growth continues to present problems of space in light of which plans for future additions to the collections and the buildings must be considered seriously.

The use of the herbarium comprises the basis for diverse studies in the field of botany and may result in monographic work of wide extent, floristic studies, manuals of wild or cultivated plants of extensive or limited geographic areas, and, as a complement to field studies, may produce most valuable data for work on breeding programs, chemical analyses, and various other avenues of research. In short, the projects of the staff often develop into studies of broader aspect than is immediately apparent. Brief statements concerning some of the current work follow.

Mr. Baranov completed his work on the variations in *Sorbus* and continues studies on plants of temperate Asia.

Dr. Brizicky is working on the Generic Flora of the Southeastern United States. His studies, however, often involve broader geographic areas or plant relationships. An example is his valuable contribution on the nomenclature of cotton, *Gossypium*, which forms part of his continuing study of the Malvaceae.

Dr. DeWolf, who has just joined the staff, has had his work interrupted by the change in location. His research interests are in the genera *Ficus* and *Dorstenia* of the Moraceae with special emphasis on the Afro-American relationships involved.

Dr. Hartley completed his study of *Zanthoxylum* in the Malesian area and turned to the genus *Lunasia*, also of the family Rutaceae. He has now named approximately 1,600 of his collections from New Guinea and in the process was able to annotate many tropical Asian specimens in the herbarium.

Dr. Howard spent a portion of the summer continuing his field studies on the elfin thickets or mossy forest on the summit of Pico del Oeste in the Luquillo Mountains of Puerto Rico. This work, which comprises a study of what is in the forest, the conditions under which the plants live, and a day by day account of what the forest is doing, represents one of the comprehensive ecological studies being conducted in the tropics. Other staff members have contributed their special talents to the study area including Miss Powell, Messrs. Fordham and Gensel, Grime and Canoso, and Drs. Wyman, Nevling, and Wood. The duration of the study has been extended to August, 1968, under the same grant from the National Science Foundation. Publication of the program and the special studies contributing to it should begin in the coming winter. In addition, Dr. Howard continues his studies of the vegetation of the Lesser Antilles with the identification of special collections from the area and the compilation of family treatments. Work has also started on a bibliography of the plants under cultivation in the American tropics. Lack of readily available references to the appropriate valid names and synonyms of tropical plants has handicapped progress in areas of science well beyond plant taxonomy. A bibliography will partially solve the problem of correct name and the authority. This is expected to be a long term project which may attract both workers and independent financial support.

Dr. Hu has continued her studies on plants from Asia and has prepared special contributions based on specimens of the Araceae borrowed from European herbaria at Paris and Copenhagen. She has made progress in the study of cultivars of *Hemerocallis* and in the preparation of special chapters in a forthcoming *Hemerocallis* handbook. A collection of plants from Mt. Omei, southwest China, made in 1938–40 by collectors for the Arnold Arboretum, has now been mounted and Dr. Hu is beginning the task of naming and inserting these specimens.

Mrs. Honor Moore of Canberra, Australia, has been appointed a Research Associate during the period her husband is in residence in the area. She is annotating our herbarium material from Australia and indicating the type specimens.

The activities of the herbarium have claimed a large proportion of the time and effort of Dr. Nevling during the year. Nevertheless, his research on *Schoenobiblus* and *Schizophragma*, and on the Thymeleaceae advances. Dr. Nevling is also coöperating with botanists from the Instituto de Biología, in Mexico, on studies of the flora of Veracruz. Approximately 1,400

specimens including duplicates were received during the year representing the initial effort of collectors in the area. Dr. Nevling will spend some time in this region during the summer. The Arnold Arboretum has agreed to subsidize a portion of the collecting in collaboration with the Jardín Botánico of the University of Mexico, and to identify the cultivated plants of the area. Specimens from this project will be available for distribution to other institutions and specialists willing to identify material representing particular families or genera from Veracruz are being sought.

Miss Dulcie Powell is revising for publication a study of the plants transported by the expeditions of Captain William Bligh and is continuing her regular studies of cultivated and native plants of tropical America and the West Indies.

Dr. Schubert has handled an unusually large amount of manuscript in her capacity as editor of the *Journal of the Arnold Arboretum*. Her studies on *Desmodium* are currently focused on the preparation of a treatment for the Flora of Tropical East Africa. Additional studies and identifications are continuing in the genera *Dioscorea* and *Begonia*. As Secretary of the Standing Committee on Stabilization of specific names of plants for the International Association of Plant Taxonomists she has the responsibility of coördinating the opinions of committee members, specialists, and other interested botanists in preparation for the report to be prepared for the next International Botanical Congress.

Dr. Wood continues to coördinate the effort of the small dedicated group of people working on the generic flora of the southeastern United States. With the resignation of Arnold Clapman, who worked as artist on the project, Miss Rachel Wheeler has been appointed staff artist. One of Dr. Wood's tasks is to keep the presentation of visual artistic material and written material as similar as possible to that previously published in the *Journal*. Dr. Grady Webster, now of the University of California at Davis, spent a portion of the summer of 1966 with Dr. Wood and prepared the treatment of the family Euphorbiaceae in the Southeastern United States. As indicated elsewhere, a new application submitted to the National Science Foundation for renewed support of this work has been approved. During the spring semester Dr. Wood taught an introductory course in the Taxonomy of Flowering Plants and continued his ever generous aid to students.

Library:

The end of the fiscal year marked the retirement of Mrs. Lazella Schwarten as Librarian of the Arnold Arboretum, a post she has held for nearly 23 years. During that time the library has grown from the 59,440 books and pamphlets recorded in the Director's Report of 1945 to a present total of 53,784 bound volumes and 20,879 indexed pamphlets for a total of 74,663. The high quality and good condition of the library, plus the ready availability of the books through the willingness of the librarian and her staff to assist scholars, have made the library of the Arnold

Arboretum outstanding among international botanical libraries. During the past year 488 bound volumes were added to the collections of which 138 were in areas of horticulture and were deposited in Jamaica Plain. Pamphlets numbering 285 were of value and were indexed and added to the collection.

Three additional major changes made during the past fiscal year are not included in the figures cited above. Bound volumes numbering about 600 on temporary deposit in the library of the Biological Laboratories since the 1930's were returned as were over 2,000 books and volumes of periodicals on the subject of forestry from the Harvard Forest. These volumes have always been included in the total count given in annual reports. Their deposit away from the main library of the Arnold Arboretum reflects the crowded conditions existing in Jamaica Plain prior to the construction of the Harvard University Herbaria building and the move to Cambridge. The relocation of these books necessitated changes on all file cards and, in the case of the forestry books, some recataloguing which is in progress. All cards in the general and combined library index of the Arnold Arboretum and the Gray Herbarium now are marked to indicate ownership of the book and its location, by code number and by letters on shelves in Cambridge or in Jamaica Plain.

Index cards, as issued, were added to the Gray Herbarium *Card Index to American Plants*, the *Torrey Index to American Botanical Literature*, and the *Index Nominum Genericorum*. Typed cards exceeding 1,200 were added to the Rehder Index to horticultural literature.

Under the direction of Miss Stephanie Sutton much work was accomplished on the historical correspondence of the staff of the Arnold Arboretum. Letters of former staff members have been arranged chronologically in new files and organized in alphabetical order by correspondents. A master card file indicates the number of letters in each folder and their dates. This work continues. We are pleased to acknowledge here the gifts of Sargent letters as well as photocopies of originals which were loaned to us.

Miss Sutton continues her work toward a biography of Charles Sprague Sargent. The problem of publication of quotations from letters to and from Sargent was solved in part, during the year, when permission was granted by the responsible heirs of Professor Sargent to quote from his correspondence. Mrs. George Slate has also given permission to quote from the letters of her father, the late E. H. Wilson, whose work was so closely connected with the development of the Arnold Arboretum.

Comparative Morphology:

For many years the contributions of the Arnold Arboretum in the area of comparative plant morphology have been primarily those of Professor Bailey and his students and assistants. Our loss is great with his death. Hopefully, we shall seek younger contributors to utilize the great collection of wood samples and microscope slides of plant parts built up during

his many years of study. Professor Bailey had completed his investigations of the leaf-bearing cacti, a group which had long occupied him during summer work in Arizona. The final paper of the series will be published posthumously in this Journal. The Marcgraviaceae is a tropical family Professor Bailey knew from British Guiana. Upon completion of his cactus studies he turned to it and his excitement over the initial preparations indicated that another study series would be developed. Regrettably these observations will be denied to us.

Through the interest of Mr. Frank Hankins in the woods of Panama, we have been able to purchase microscope slides prepared from Panama woods previously unsectioned from our own collections and those of the Yale School of Forestry. In addition, approximately 150 slides added to the collection represent material received in exchange for wood samples.

Education:

Two regularly scheduled classes within the College of Arts and Sciences of the University were offered by Arboretum staff members. During the fall semester Dr. Howard taught Biology 209, "The Phylogeny of Flowering Plants," and in the spring semester Dr. Wood taught Biology 103, "The Taxonomy of Vascular Plants." Dr. Hartley taught the course in general botany offered by the Harvard University Commission on Extension Courses. In addition, the staff assisted in the supervision of the research or writing of graduate students and participated, as speakers or as commentators, in the seminars open to undergraduates and graduate students.

Non-credit courses open to the public were offered throughout the year in Weston and in Jamaica Plain as a contribution of the staff. Regular field classes were conducted by Drs. DeWolf, Wood, and Wyman, while, in addition, staff members Flint, Fordham, Howard, Nevling, Williams, and Wood also contributed to a special series of lectures and field trips held in Weston during the spring. Guided tours of the grounds of the Arnold Arboretum and special tours of the Case Estates were available to groups, on written request. These are most frequent in the spring. Because of the unusual weather this year many trips had to be repeated when flowering conditions became more satisfactory. Open Houses, including tours, were held for the Harvard Dames, the staff of the Department of Biology, and several national touring parties of horticulturists.

The staff did not prepare an exhibit for the Spring Flower Show of the Massachusetts Horticultural Society but four staff members, Messrs. Flint, Fordham, and Williams, and Dr. Hu gave lectures and/or demonstrations. A special exhibit of flowering shrubs and trees was prepared for the Worcester County Horticultural Society to supplement its annual *Iris* show.

A coöperative program in training in horticultural and botanical sciences has been conducted with Keuka College and the Jamaica Plain High School. Students from each of these schools have been given short

periods of employment under supervision in order that they may learn curatorial, laboratory, or greenhouse techniques from the Arboretum staff. At Weston Junior High School an Interdisciplinary Team Teaching Program this spring selected the Arnold Arboretum and the Case Estates as a study area. Miss Marian Case had encouraged such scholastic interest during the days of the Hillcrest School when she offered prizes for the best studies of Weston School pupils. The Interdisciplinary Team project offered a similar opportunity to reward student interest in the work of the Arboretum. Cash prizes were awarded to Gregory Morrow, Catherine Searle, and Bruce Howard for the three papers judged best by their teachers. Honorary mention awards, reproductions of the drawing "Davidia," by Blanche Ames, were made to Jon Conant, Thomas Griffin, Lois Leonhardt, Richard Powers, and Nancy Raffio.

Staff members were guest lecturers to many groups during the year. Dr. Flint spoke to the Gardeners' and Florists' Club of Boston, the Connecticut Rhododendron Society, and at the University of New Hampshire. Mr. Fordham conducted several special demonstrations and tours of the Arboretum greenhouses for classes from colleges in four New England states and from the Niagara Parks Commission's School of Horticulture. Dr. Howard spoke at Auburn Community College, Auburn, New York, on a visit sponsored by the American Institute of Biological Sciences. He was also a program speaker at the annual Fall Symposium of the Missouri Botanical Garden which considered the subject "Systematics and Natural Areas." The Department of Botany at Miami University, Oxford, Ohio, sponsored his visit to that campus. During the year two programs were prepared for the School of Global Medicine of the U. S. Naval Medical School. These were "Tropical Flora of Medical Importance" and "Edible Plants of the Tropics." Both programs were recorded on closed circuit television in color and prepared for distribution to the Armed Forces as training tapes or 16 mm. film. Dr. Nevling was a guest lecturer to the Department of Botany of the University of Connecticut. Dr. Wyman was the principal speaker at the annual meetings of the American Rhododendron Society in Asheville, North Carolina, the Garden Clubs of Cincinnati, Ohio, and the Northeastern Section of the International Shade Tree Conference in Portland, Maine.

Again this year the staff assumed the responsibility for local arrangements in Cambridge for the midwinter meeting of the Northeast Section of the American Society for Horticultural Sciences.

Travel and Exploration:

The International Horticultural Congress and the annual meeting of the American Institute of Biological Sciences were held simultaneously on the campus of the University of Maryland in College Park. All staff members who could attend did so and many took part in meetings, served on committees, organized symposia or presented papers.

Dr. Wyman organized and conducted a section meeting on amateur

horticulture for the International Society of Horticultural Science. He was in charge of the presentation of awards at the banquet of the American Horticultural Society. Dr. Nevling organized a symposium on the Diverse Applications of Plant Taxonomy for the American Society of Plant Taxonomists. Dr. Howard served as a representative at the meeting of the Commission on Nomenclature and Registration and presented an invitational paper in a symposium on the "Nomenclature and Registration of Cultivars."

Dr. Flint attended the annual meetings of the Society for Cryobiology and with Mr. Fordham attended the annual meeting of the International Plant Propagators Society where Flint spoke on testing landscape plants for hardiness in Vermont, and Fordham reported on "Woody plants difficult to root."

Miss Powell represented the Arboretum at the first annual meeting of the Caribbean Conservation Commission, held in Grenada. She explored the area of Morne Quaqua and later, a mountain on St. Kitts, to determine the possibility of using these areas for further studies of elfin thickets. Material from each area was also returned to Boston by air mail to determine the possibilities of such a method of shipment for scientific studies of living specimens.

Dr. Schubert attended the A.E.T.F.A.T. meetings held in Uppsala, Sweden, and before and after these meetings visited and worked in herbaria in Paris, Stockholm, Vienna, and at Kew and the British Museum (Nat. Hist.), in London. Later she again represented the Arboretum at the third Mexican Botanical Congress in Mexico City. She made a short



The 1966 plenary session of the Association pour l'Etude Taxonomique de la Flore d'Afrique Tropicale (A.E.T.F.A.T.) held in Uppsala, Sweden. Dr. Bernice Schubert represented the Arnold Arboretum at these meetings.

field trip following the Congress to locate material of *Nanarepenta tolu-cana* Matuda, purportedly rare, which may well be a species of *Dioscorea* already described.

Dr. Wood attended a special symposium on terrestrial plant ecology held at St. Francis Xavier University in Nova Scotia.

Gifts and Grants:

The Arnold Arboretum is fortunate to receive small monetary contributions from many people who visit the grounds throughout the year. This immediate expression of appreciation is warmly received. We value equally highly the generous response to an annual appeal made to the contributors of longer standing who are the Friends of the Arnold Arboretum. During the past year the gifts for current use have been assigned to support work in horticulture in Jamaica Plain, except for the few specified for other purposes. Additional summer help on the grounds and in the greenhouses was made possible by these gifts. An additional bequest from the estate of Laura Lucretia Case was added to the endowment funds of the Arnold Arboretum.

Gifts and grants were also received in support of specific portions of the living collections and for the research of the staff. Most significant was the grant made for the support of a *Generic Flora of the Southeastern United States* under the direction of Dr. Wood. The project supported by the grant has been approved for a period of five years although the present grant covers only the first two. This continuing study was supported in its initial stages by Mr. George R. Cooley and, more recently, by other grants from the National Science Foundation. Forty-five papers treating 76 families and 249 genera of flowering plants have already been published for this study in the *Journal of the Arnold Arboretum*.

We are pleased to acknowledge the many gifts of plants, books, manuscripts, and similar material items which increase the value of the Arboretum as a research and reference institution. Mr. William J. Flemer of the Princeton Nurseries has supplied valuable plant material for the street tree collection. Mrs. A. F. Bonsal of Upper Montclair, New Jersey, has been instrumental in obtaining for us *Iris* rhizomes of the Dykes medal winners to supplement the display and teaching collection at the Case Estates. Mr. Nathaniel Whittier of Medfield, Massachusetts, has donated many bulbs of interesting taxa of *Allium*.

The University of New Hampshire made a gift of the Latimer Seed Collection which is to be used as a teaching and reference collection at the Dana Greenhouses.

Additional research material on the Caribbean area from the library of the late George H. Hamor was a gift of his widow. Mrs. Van Wyck Brooks presented the Arboretum with the original letters she had received from Professor Sargent.

These gifts and many others are of significance and value to the increasing collections of the Arnold Arboretum.

Publications:

The twelve numbers of *Arnoldia* issued annually, but at irregular intervals, are contributions of the Arboretum staff to the field of horticulture. During the past year several invitational articles of special interest were published. A paper by Dr. John Creech of the United States Department of Agriculture was presented at the annual meeting of the American Horticultural Society in Georgia and published in *Arnoldia* as "Expeditions for New Horticultural Plants." At the International Horticultural Congress Dr. Peter Lapin of the Main Botanical Gardens in Moscow spoke of the efforts of that organization in plant introduction and on the hardiness of ornamental shrubs. He agreed to revise this presentation and describe his research in a special article which we were pleased to publish as "Seasonal Rhythm of Development of Woody Plants and its Importance in Introduction."

The work of Dr. Wyman and Dr. Flint in revising the plant hardiness map which serves as a basis for numerical indication of plant hardiness comprised another issue of *Arnoldia*. The accompanying text compared the several systems of hardiness zonation now in use. Copies of this bright and clear new color reproduction have been distributed to botanists and horticulturists throughout the country.

Dr. Schubert served as editor of the *Journal of the Arnold Arboretum*. Four issues published during the year comprised 387 pages and 22 papers. The first of Dr. Philip Munz's studies of *Delphinium* and *Consolida* of Africa and Asia were published in 1967. This series, treating some important collections of the Arnold Arboretum, will continue through April, 1968.

Dr. Howard was guest editor of the July, 1966, number of the *Newsletter of the American Association of Botanical Gardens and Arboreta* which featured a survey of methods of security and the problems of protection of plants and people in the botanic gardens and arboreta of North America.

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RICHARD A. HOWARD, *Director*

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Mercer Research Fellows

during at least part of fiscal year 1966–1967

- WILLIAM GENSEL, University of Rhode Island, Providence, Rhode Island.
 PABLO RAUL LEGNAME, Instituto Lillo, Tucuman, Argentina.
 SANDRA SHANNON, University of Massachusetts, Amherst, Massachusetts.
 CHARLES C. TSENG, Windham College, Putney, Vermont.
 FRANCIS H. WOLFE, University of New Hampshire, Dover, New Hampshire.

† Died January 6, 1967.

Staff of the Arnold Arboretum

1966-1967

RICHARD ALDEN HOWARD, Ph.D., Arnold Professor of Botany, Professor of Dendrology, and Director.

IRVING WIDMER BAILEY, S.D., Professor of Plant Anatomy, *Emeritus*.†
KARL SAX, S.D., Professor of Botany, *Emeritus*.

PRISCILLA JEAN JAMES-ASHBURNER, Business Secretary.
ANDREY I. BARANOV, Curatorial Assistant.
GEORGE KONSTANTINE BRIZICKY, R.N.Dr., Botanist, Southeastern Flora Project.
MICHAEL ANTHONY CANOSO, M.S., Senior Curatorial Assistant.*
GORDON PARKER DEWOLF, JR., Ph.D., Horticultural Taxonomist.
HENRY DRAPER, Superintendent, Case Estates.
HARRISON LEIGH FLINT, Ph.D., Associate Horticulturist.
ALFRED JAMES FORDHAM, Propagator.
WILLIAM ED GRIME, B.A., Curatorial Assistant.*
THOMAS GORDON HARTLEY, Ph.D., Associate Curator of Pacific Botany.
HEMAN ARTHUR HOWARD, Assistant Horticulturist.
SHIU-YING HU, Ph.D., Botanist.
MARGARET CATHERINE LEFAVOUR, Herbarium Secretary.
VICTOR FERENC MARX, M.Lib., Librarian.*
HONOR CAPEL MOORE, M.Sc., Research Associate.
LORIN IVES NEVLING, JR., Ph.D., Associate Curator and Supervisor of the Herbaria.*
DULCIE ALICIA POWELL, M.A., Research Fellow.
BERNICE GIDUZ SCHUBERT, Ph.D., Associate Curator and Editor.
LAZELLA SCHWARTEN, Librarian.* **
STEPHANNE BARRY SUTTON, A.B., Research Fellow.
ROBERT GEROW WILLIAMS, B.S., Superintendent.
CARROLL EMORY WOOD, JR., Ph.D., Associate Curator.
DONALD WYMAN, Ph.D., Horticulturist.

† Died May 16, 1967.

* Appointed jointly with the Gray Herbarium.

** Retired June 30, 1967.